HISTORICAL DDT USE

IN THE

NORTHERN REGION

By

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I. GENERAL

The Forest Service use of DDT in the western United States has been primarily to control epidemic outbreaks of spruce budworm and Douglas-fir tussock moth. Approximately 13 million forested[1/] acres were aerially sprayed in the western U.S. between 1947 and 1974 for control of these two insects (Table 1). In 1957 6500 acres in Glacier National Park were sprayed with DDT to control the black-headed budworm. Approximately 4,620,000 acres in the Northern Region were aerially sprayed with DDT during this same time period.

Table 1: Forest Land DDT Use in Western U.S. (1947-1974)

State	Acres Treated (nearest thousand)
Oregon	4,676,000
Idaho	3,850,000
Montana	2,984,000
New Mexico	1,066,000
Washington	490,000
Wyoming (Yellowstone NP)	127,000
Arizona	105,000
California	90,000
Colorado	90,000
Nevada	0
Utah	0

1/ Primarily National Forest lands.

II. TARGET SPECIES

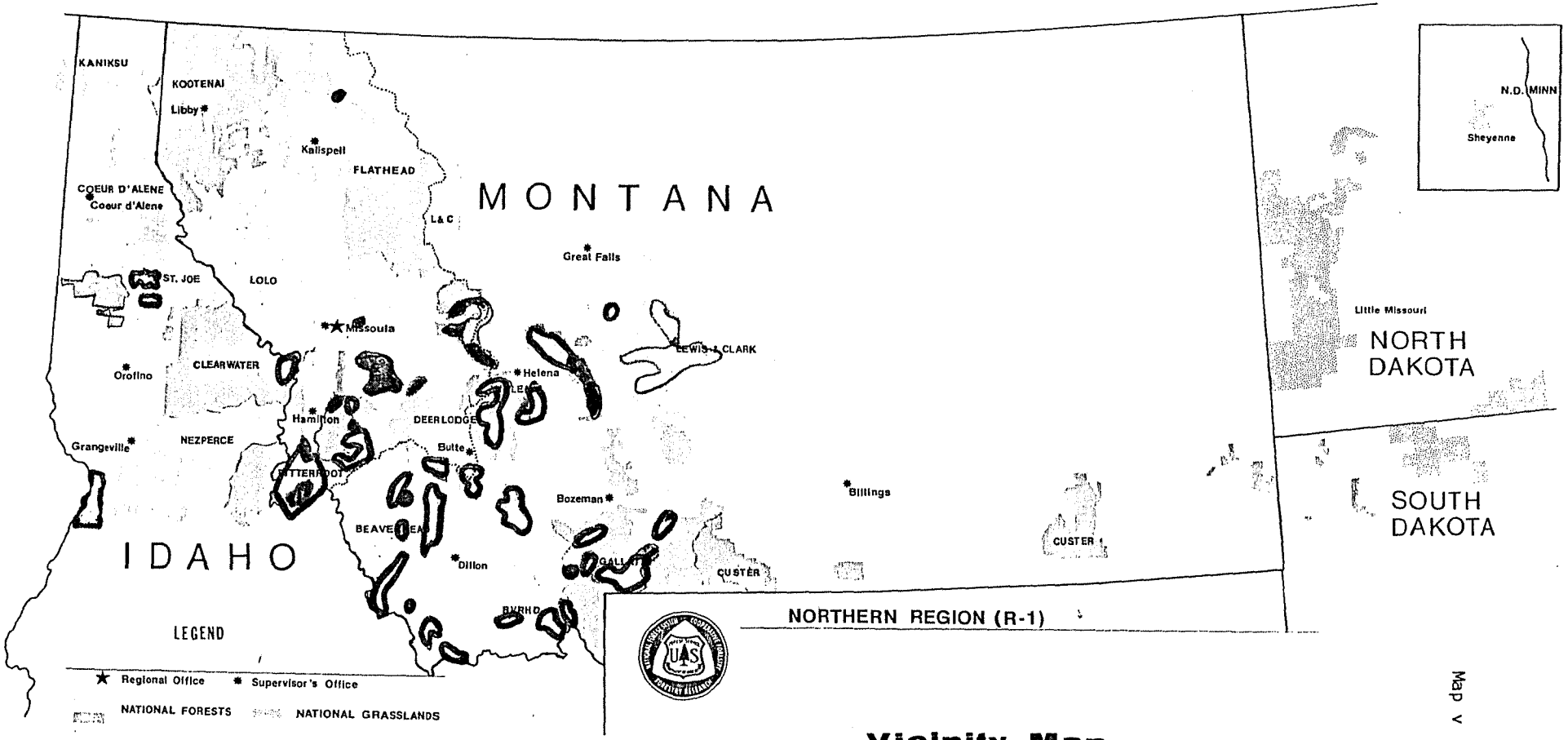
The spruce budworm is found primarily in the warmer, drier subalpine and Douglas-fir forests rather than the cooler, damper subalpine fir forests. Ponderosa pine and lodgepole pine forests are seldom inhabited by this insect. DDT spruce budworm control in the West was centered in (1) southwestern Montana/central Idaho and (2) southern Colorado/northern New Mexico. In the Northern Region approximately 3,289,400 acres were aerially sprayed with DDT between 1953 and 1964 for control of spruce budworm.

The interior Douglas-fir, white fir, and grand fir are the principle tussock moth host species. The use of DDT to control tussock moth outbreaks centered in eastern Washington, northeastern Oregon, and northern Idaho. In the Northern Region approximately 1,331,000 acres were aerially sprayed with DDT for tussock moth control between 1947 and 1974.

III. APPLICATION RATES

The general spray formulation used consisted of one pound of 12 percent active ingredient DDT dissolved in 1.2 quarts of hydrocarbon solvent and type A diesel fuel added as a carrier to make 1 gallon. Spray projects from 1947 to 1962 generally applied one gallon (1 lb. DDT) spray solution per acre. After 1962 the application rates were generally reduced to 0.5 - 0.75 pounds of DDT per acre. Map 1 identifies the portions of the Northern Region sprayed with DDT and the accumulative totals of DDT applied (pounds DDT per acre). Areas identified

MAP 1



Vicinity Map

Sprayed 2#/acre DDT

Sprayed >2.00#/acre DDT

Sprayed 1.5#/acre DDT

Sprayed 1#/acre DDT

Sprayed 0.5#/acre DDT

with more than one pound DDT per acre were sprayed twice between 1947 and 1974 and comprise about 20 percent of the total spray area.

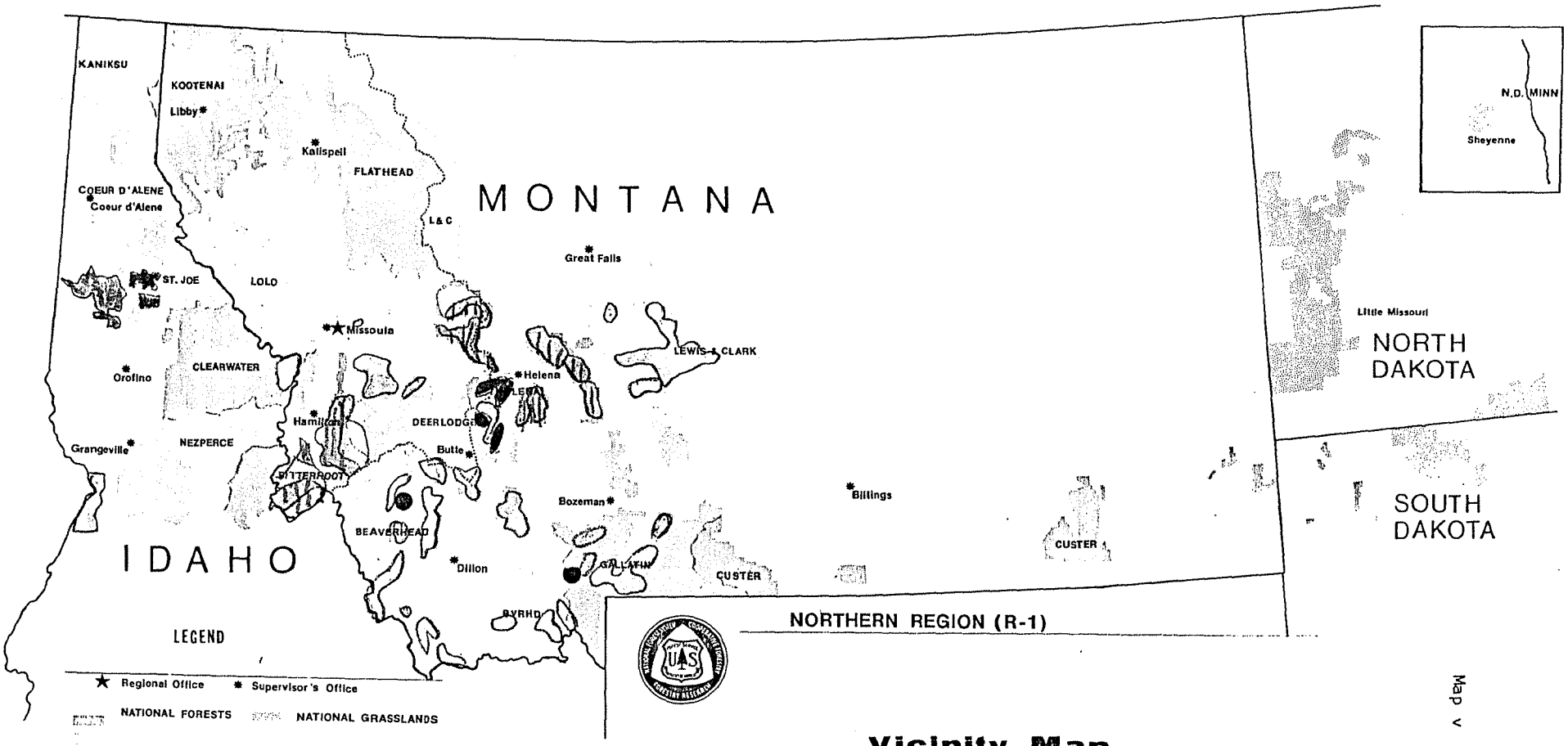
IV. YEARLY SUMMARY

Northern Region DDT use first occurred as an experimental tussock moth control project in north Idaho in 1947. One pound of DDT per acre was applied from fix-wing aircraft on 395,000 acres in this project. Between 1952 and 1964 routine DDT spruce budworm control projects occurred in the Region. Tussock moth control projects using DDT occurred in 1961, 1965, and 1974 in north Idaho. The 1974 project was the last DDT use on National Forest lands in the United States. Table 2 summarizes, by year, the acres treated with DDT in the Northern Region. The peak Regional DDT use occurred in 1962-1963. Map 2 depicts the use of DDT in relation to years since last spray. Virtually all Forest Service lands in southwestern Montana have been sprayed at one time or another, while most of the Northern Region land in Idaho and northwestern Montana have never been sprayed with DDT. See Appendix Table 1 for more specific information.

V. FOREST - SUMMARY

Table 3 shows the total Northern Region acres treated and pounds of DDT applied by Forest. DDT has never been applied on the Coeur d'Alene, Custer, Flathead, Kaniksu, and Kootenai National Forests. See Appendix Table 1 for more specific information.

MAP 2



Map A

Vicinity Map

Sprayed less than 10 years ago

Sprayed 20-25 years ago

Sprayed 25-30 years ago

Sprayed over 30 years ago

Never Sprayed (Nat'l Forest Land)

Table 2: Yearly Summary of DDT Use (acres sprayed)

Year	Idaho	Montana	Total
1947	395,000 (private land included)	0	395,000
1952	0	12,000	12,000
1953	16,070	117,140	133,210
1955	70,710	246,530	317,240
1956	119,370	765,880	885,250
1957	0	719,500	719,500
1958	0	18,200	18,200
1959	0	126,880	126,880
1960	0	117,850	117,850
1962	0	451,760	451,760
1963	0	415,120	415,120
1965	225,000 (private land included)	0	225,000
1974	88,400	0	88,400

13 spray years

Table 3: Forest DDT Use

National Forest	Total Acres Treated	Total Pounds Applied
Lewis and Clark	617,460	491,240
Helena	533,910	393,240
Deerlodge	531,040	442,085
Beaverhead	510,310	510,310
Bitterroot	418,160	363,065
Gallatin	309,080	283,275
Clearwater	255,000	232,000
St. Joe	176,000	153,900
Nezperce	86,780	86,780
Lolo	64,400	32,200
Coeur d'Alene	0	0
Custer	0	0
Flathead	0	0
Kaniksu	0	0
Kootenai	0	0

VI. AGRICULTURAL DDT USE

Although little specific information is available on DDT use on agricultural lands in Idaho, Montana, or North Dakota, we can map general areas where DDT use was likely. Using land system inventory maps (USDA, 1976; USDA, 1980; and USDA, 1981) those areas suitable for agriculture can be identified (Map 3). Because of the widespread use of DDT during the 1950's and 1960's on agricultural land, I have assumed that all cropland areas received DDT. DDT application on agricultural lands was likely at much greater rates then was used on National Forest lands. In addition, other chlorinated hydrocarbon pesticides; e.g. aldrine and endrine, were probably routinely used on agricultural lands through the 1970's.

V11. AREAS ISOLATED FROM DDT APPLICATION

Areas isolated from local sources of DDT are identified on Map 4. The degree of isolation is a function of (1) Forest Land DDT spray areas (Map 1), (2) cropland areas (Map 3), and (3) hydrologic unit patterns. Hydrologic unit patterns were used to identify downstream zones where DDT was applied somewhere in that drainage.

Three Northern Region areas have a relatively high degree of isolation from local sources of DDT; (1) the Swan River drainage, the North Fork, Middle Fork, and South Fork Flathead River drainages; (2) the St. Joe and North Fork Clearwater River drainages; and (3) the Middle Fork and South Fork Clearwater River drainages. These three areas, because of their large contiguous size and distance from spray areas, should have relatively low DDT residuals during and since the spray period (1947-1974).

Five Northern Region areas have a moderate degree of isolation from local sources of DDT; (1) the Priest River drainage, (2) the Purcell and Salish Mountains, (3) upper Coeur d'Alene River drainage, (4) the Absaroka-Beartooth area east of the Boulder River, and the higher elevations along the Rocky Mountain Front. I rated these areas lower in isolation then the preceding group primarily because of smaller contiguous size.

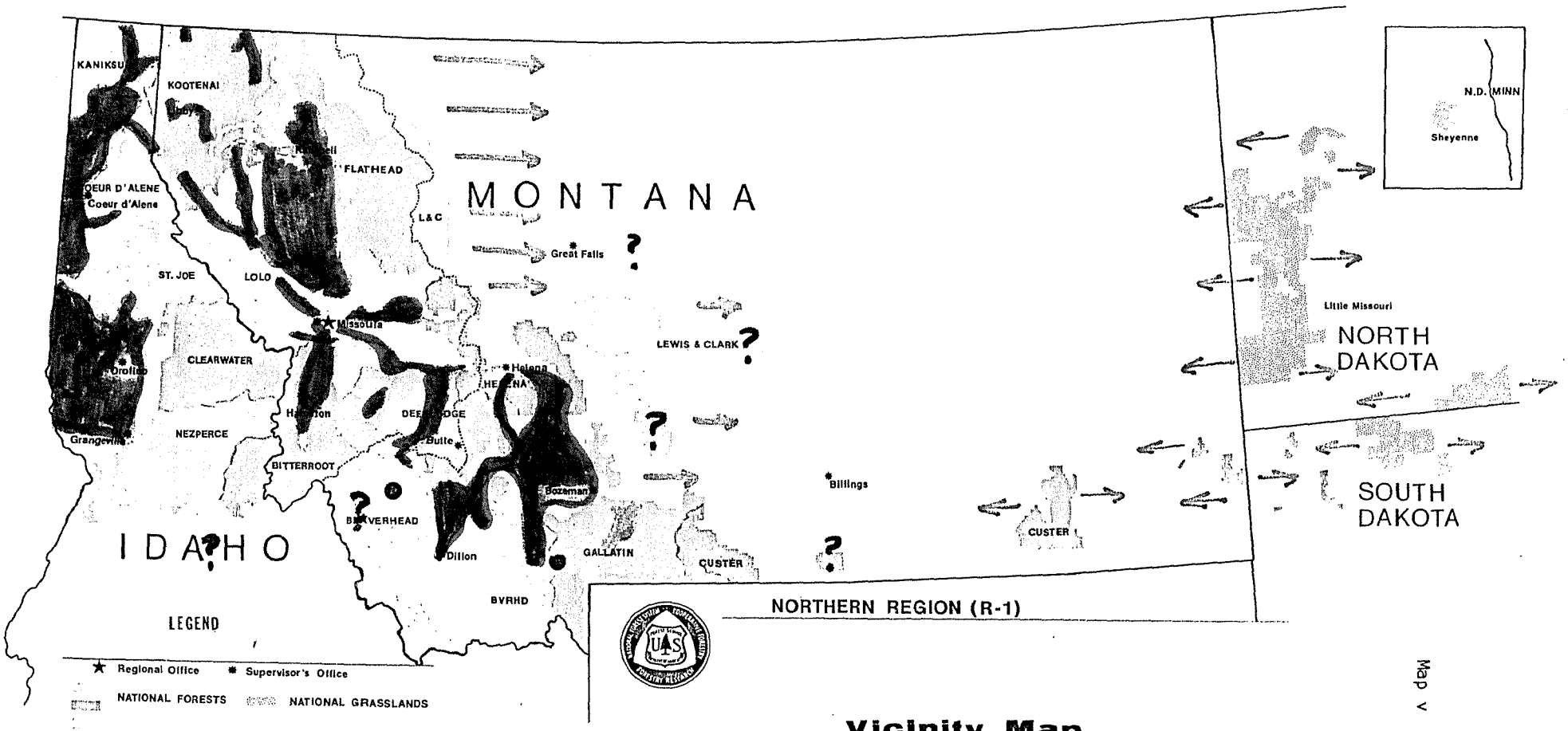
Six areas which did not receive direct DDT application are (1) Highwood Mountains, (2) Castle Mountains, (3) Crazy Mountains, (4) Pryor Mountains, (5) Anaconda-Pintlars, and (6) Salmon River drainage. These areas would have a lower isolation rating then the preceding group.

The rest of the Region was either directly sprayed with DDT or associated with lands which were. DDT residual risk can be further stratified in these areas by assessing (1) whether or not the area was actually sprayed, (2) amount of DDT applied, (3) time since last spray, and (4) distance from spray areas.

V111. DISCUSSION

Those areas isolated from local sources of DDT (MAP 4) should have lower residual DDT levels then other parts of the Region. Whether raptor populations were effected by DDT in these isolated areas and to what degree is not known. The effects of DDT in these areas would depend upon many factors; including migratory behavior, food chain relationships, prey selection, degree of isolation, other then local sources of DDT, and the presence of other chorinated hydrocarbon pesticides. Two of the Northern Region's Endangered Species, the peregrine falcon and the bald eagle, were listed primarily because of population declines linked to DDT syndrome. The following is a discussion of these two

MAP 3



Map v

Vicinity Map

Agricultural Lands Likely Receiving DDT

? DDT use immediately around these areas unknown

species in relation to the historical DDT use patterns within Idaho, Montana, and North Dakota.

Peregrine Falcon

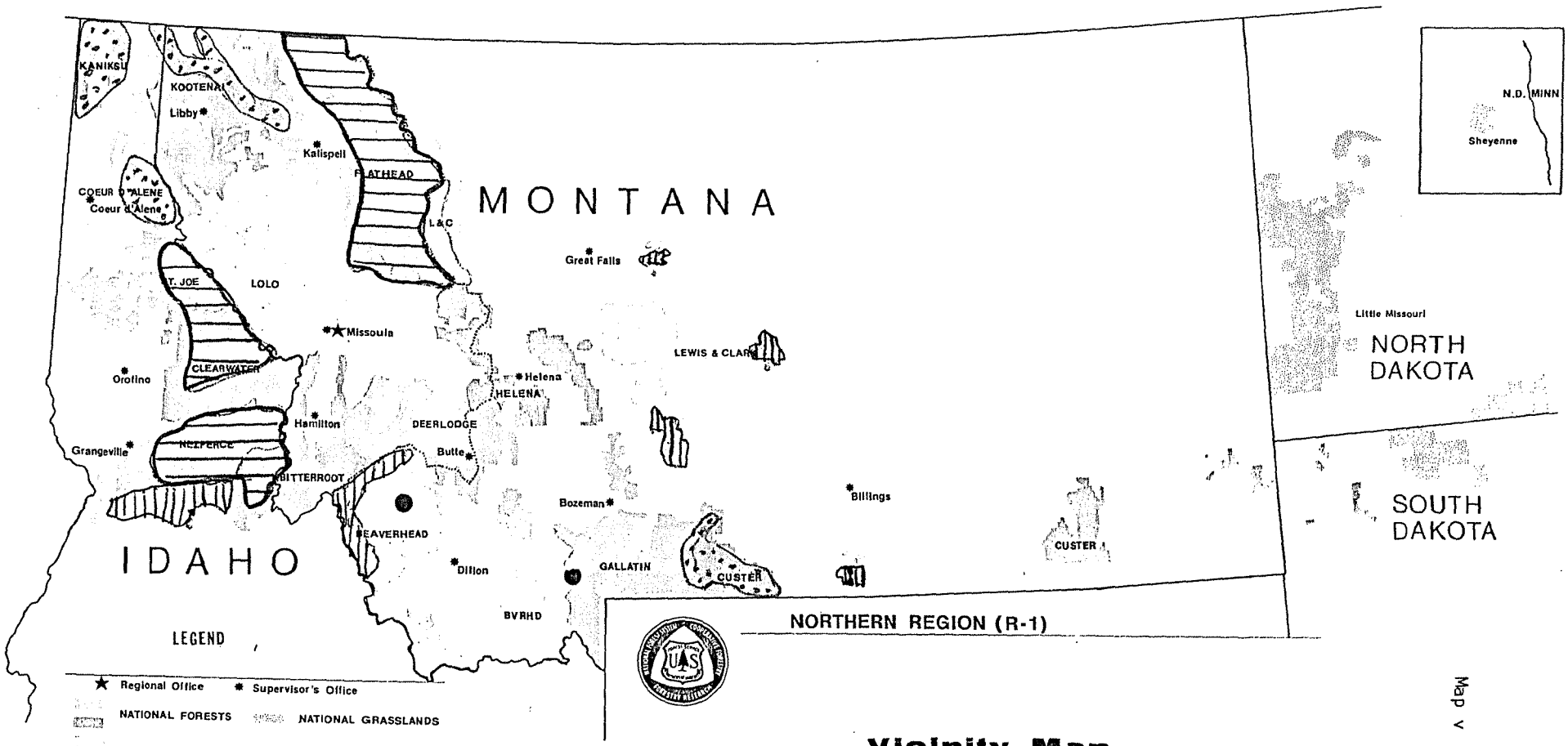
The probability that peregrine remnant populations exist in the Northern Region I feel is great because of recurring peregrine summer sightings. The most probable areas where remnant populations could have made it through the DDT era are those portions of the Northern Region isolated from local sources of DDT (Map 4). The recent summer sightings of peregrines and the most recent documented historic eyries generally coincide with these isolation areas. Most of the peregrine historic sites in the Region are within areas of low isolation from local sources of DDT. It is not surprising that these sites are no longer active. Areas with the greatest chance of having an active peregrine eyrie is a site (1) within a high isolation zone, (2) associated with a resident, woodland passerine prey base, and (3) not highly migratory or migrates to areas with relatively low DDT residuals.

The relationship between historic DDT use patterns and peregrine reintroduction site suitability is not as clear cut as remnant population probabilities. Because of the time elapsed since most of the Forest Service lands were sprayed (over twenty years) there may not be a significant difference in DDT residuals on sprayed and not sprayed areas. Exceptions to this are (1) areas associated with agricultural lands where chlorinated hydrocarbon chemicals have been used through the 1970's and (2) aquatic systems functioning as pesticide sinks.

Bald Eagle

The bald eagle population within Montana appears to have been expanding since the late 1970's. The core areas from which the expansion has occurred generally coincides with areas isolated from local sources of DDT, or areas where DDT use has not occurred in the last 25 years. The bald eagle expansion should continue with the most delayed recovery occurring in those areas associated with or down drainage of agricultural lands sprayed with chlorinated hydrocarbon chemicals through the 1970's.

MAP 4



Map V

Vicinity Map

High Degree of Isolation

Moderate Isolation

Not Sprayed Directly

low isolation

IX. REFERENCES CONSULTED

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APPENDIX TABLE 1

DDT USE BY FOREST AND YEAR

Year	Target	Acres Sprayed	lbs. DDT/acre		lbs. DDT
Beaverhead NF					
1956	budworm	251,540	1.0		251,540
1957	budworm	240,770	1.0		240,770
1963	budworm	18,000	1.0		18,000
	Total:	510,310		Total:	510,310
Bitterroot NF					
1952	budworm	12,000	1.0		12,000
1955	budworm	169,090	1.0		169,000
1959	budworm	126,880	1.0		126,880
1963	budworm	110,190	0.5		55,095
	Total:	418,160		Total:	363,065
Clearwater NF & St. Joe NF (Paluse area)					
1947	tussock moth	125,000	1.0		125,000
1956	budworm	119,370	1.0		119,000
1965	tussock moth	88,500	0.75		66,400
1974	tussock moth	88,500	0.75		66,400
Deerlodge NF					
1956	budworm	106,800	1.0		106,800
1957	budworm	245,330	1.0		245,330
1962	budworm	96,590	0.5		48,795
1963	budworm	82,320	0.5		41,160
	Total:	531,040		Total:	442,085
Gallatin NF					
1955	budworm	77,440	1.0		77,440
1957	budworm	113,790	1.0		113,790
1960	budworm	66,240	1.0		66,240
		51,610	0.5		51,610
	Total:	531,040		Total:	442,085
Helena NF					
1953	budworm	117,140	1.0		117,140
1956	budworm	153,630	1.0		153,630
1958	budworm	18,200	1.0		18,200
1962	budworm	209,810	0.5		104,905
1963	budworm	35,130	0.5		17,565
	Total:	533,910		Total:	393,240
Lewis & Clark NF					
1956	budworm	253,910	1.0		253,910
1957	budworm	113,110	1.0		113,110

1962	budworm	145,360	0.5		72,680
1963	budworm	105,080	0.5		52,540
	Total:	617,460		Total:	491,240

Lolo NF

1963	budworm	64,400	0.5		32,200

Nezperce NF

1953	budworm	16,070	1.0		16,070
1955	budworm	70,710	1.0		70,710
	Total:	86,780		Total:	86,780

Forests not listed were never sprayed with DDT.